Since our debunking of the "Electricity saving box" in the November 2007 issue, another device along the same lines has appeared in Harvey Norman stores. Called the "Enersonic Power Saver" it claims potential power savings of up to 24%. At $59.00, it is considerably more expensive than the previous device but just like that one, it won't save you a cent on your electricity bills.

Enersonic Power Saver

Sorry . . . it doesn't work either!

By LEO SIMPSON

A number of readers contacted us by phone and email to ask about the "Enersonic Power Saver". This was featured on the Seven Network's "Sunrise" program on March 3rd and is the subject of favourable comment on a number of websites, such as **www.gadgetguy.com.au**

Those who had seen the Electricity saving box article were curious/concerned/outraged that a similar device would appear so soon after the first had been thoroughly debunked.

We promised to follow it up and checked the Harvey Norman website to find out about the device.

I then went to our nearest store and while the helpful salesman knew about it, they did not yet have stock available. As I left, he remarked that it "worked by cutting the amperage, not voltage". "Hmm, that's interesting", I thought.

The poor sod had no idea...

On the way back to the SILICON CHIP offices, I remembered that an American company devised a power reduction circuit for induction motors during the 1970s. This used a phase-controlled Triac to slightly reduce the voltage to the motor which apparently had the effect of reducing power consumption while not making much of a difference to reliable running of the motor.

In such a device, you cannot reduce the voltage by very much, say no more than 15 or 20%, otherwise the induction motor would refuse to start and be at risk of burnout.

In practice, I think the device did not catch on and its power savings would

have been marginal anyway.

So I wondered whether this new Power Saver could possibly be based on a phase-controlled Triac.

The reason for thinking along these lines was that the promo photos for the Power Saver, in the Harvey Norman catalog, showed it in conjunction with a 2-door refrigerator, a front-loading washing machine and a wide-screen TV (plasma or LCD?). Both the first two appliances would use an induction motor.

But I also noted that the Power Saver is suited to appliances up to 2400W (10A). That would probably rule out use of a Triac inside the plastic case. Why? Because a rule of thumb is that a Triac will dissipate a little over one watt for each amp of current that it controls.

So if the Power Saver used a Triac, its total dissipation when controlling an appliance load of 2400W would be 12W or more – too much inside a plastic case with no ventilation.

So that meant the Power Saver was probably predicated on power factor correction, just like the Electricity saving box. As soon as we obtained a unit, we would be able to confirm that.

The first thing we did when we unpacked the unit was to check the capacitance between the Active and Neutral prongs on the integral 3-pin plug.

Yep, it was 6.11µF; not much different from the 6.2µF capacitor we found in the Electricity saving box. So it is the same product dressed up in a different box.

We could end this report right here and state that these things are a fraud and a total waste of money. That would please people who read our November 2007 article and they could sagely nod their heads but it would leave others none-the-wiser.

So we had better explain.

By the way, we should state that incredibly, at least one person has read the November 2007 article and has not realised that the Electricity Saving Box is a fraud.

Maybe we did not say it strongly enough.

THE ELECTRICITY SAVING BOX DOES NOT SAVE ELECTRICITY. IT IS A FRAUD.

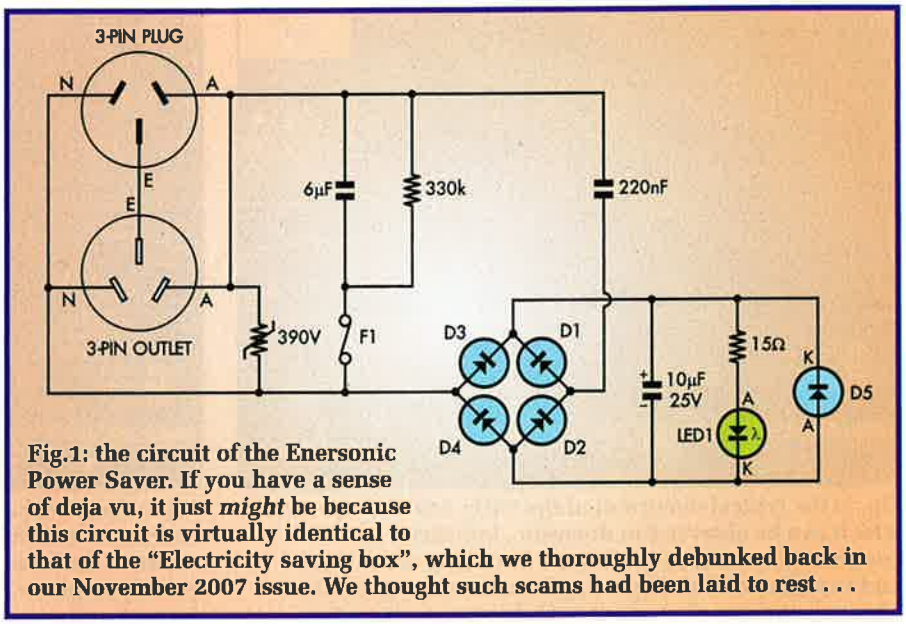


Fig.1: the circuit of the Enersonic Power Saver. If you have a sense of deja vu, it just *might* be because this circuit is virtually identical to that of the "Electricity saving box", which we thoroughly debunked back in our November 2007 issue. We thought such scams had been laid to rest . . .

There, that oughta do it.

In brief, "power factor correction" is a process whereby lagging currents drawn by inductive loads such as fluorescent lights and motors are brought back into phase with the 50Hz sinewave of the voltage waveform.

Such lagging currents (ie, out of phase with the sinewave voltage waveform) are a problem for the electricity supply authorities because they place additional load on the alternators, substation transformers and the distribution system in general.

Power factor correction is very worthwhile in industrial and commercial buildings which have large numbers of fluorescent lights and induction motors. In fact, fluorescent lights installed in commercial and industrial buildings must all have power factor correction capacitors inside the battens.

But here is the rub: fluorescent lights for domestic installations usually do not include power factor correction capacitors because the supply authorities do not regard it as a problem.

Furthermore, your household power meters only measure watt-hours or

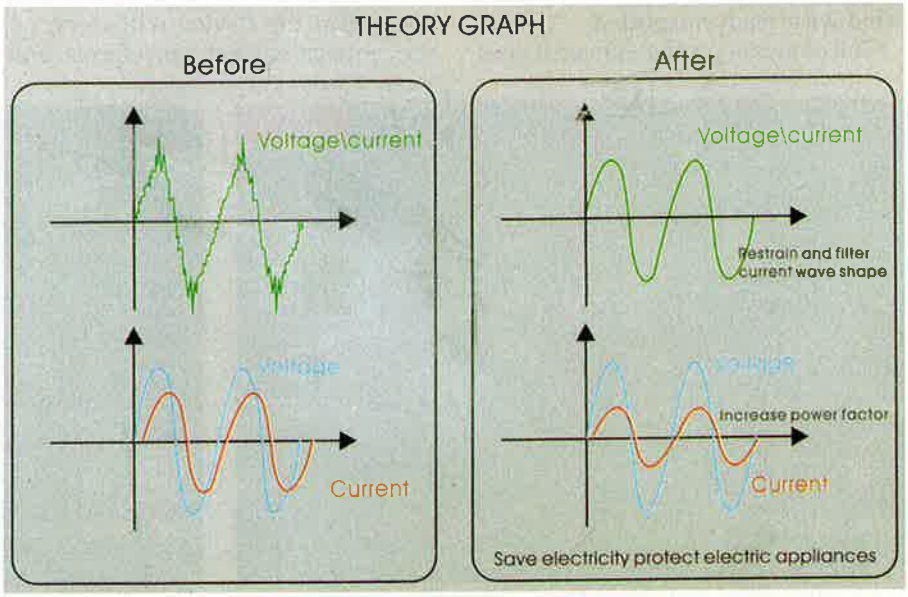


Fig.2: gee, they could be on to something here . . . This diagram comes from the box the Enersonic came in. If this device could turn the green before waveform into the green "after" waveform, it might be useful as a spike suppressor. But it's not – and it sure ain't gonna lower your power bills! The words "naive" and "gullible" spring to mind – but so should the words "consumer protection."

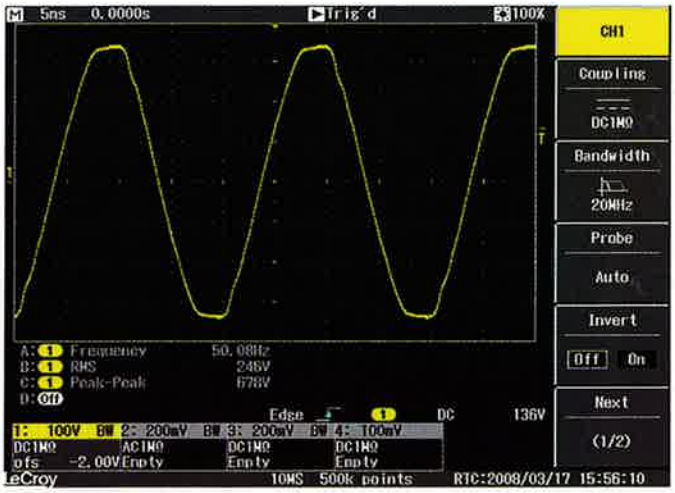


Fig. 3: the typical distortion of the 50Hz 240VAC sinewave which can be observed in domestic, industrial and commercial premises. Notice the flattening of the peaks and troughs and the slight ripple in the sloping sections. This was measured at about 3.3% harmonic distortion.

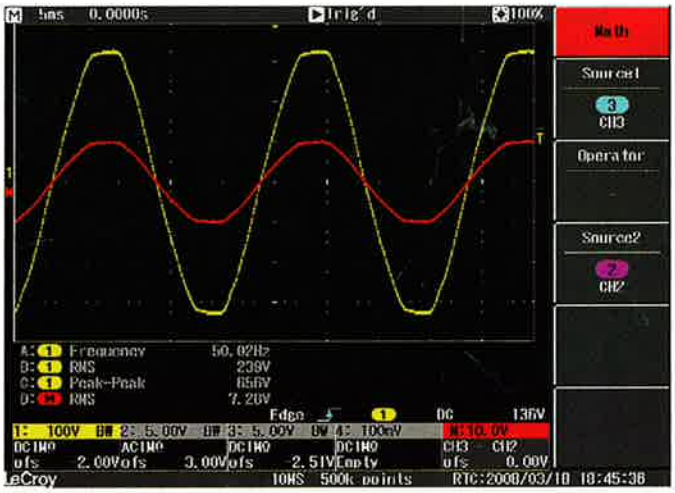


Fig.4: these scope waveforms demonstrate the voltage and current waveforms for a 500W halogen spotlight. This resistive load has the voltage (yellow) and current (red) exactly in phase and the power factor is 1 (or 100%). All heaters and incandescent lamps are resistive loads.

kilowatt-hours. They do not measure "reactive power" (kVAr) which only becomes significant if power factor is a problem.

So even if you use an Enersonic Power Saver to totally correct the power factor in your household installation, there will be no saving in power. Zero! In fact, because the Power Saver has an internal circuit to run its LED indicator, it will actually draw a small amount of additional power. So you will pay more, just to run the Power Saver!

After we had run all the tests on the unit, we pulled it apart to confirm what we already suspected.

The photos show that indeed it does use a capacitor and it is labelled "6µF 450V AC". It also contains a small PC board which has a fuse (why?), a VDR (voltage dependent resistor) and a power supply to light the single LED.

It is almost identical to the circuit of the Electricity saving box discussed in the November 2007 issue. What a coincidence! The details are shown in Fig.1.

Voltage stabilisation

Apart from making outrageous claims about power saving, the makers of the Enersonic Power saver also claim that the device will clean up the voltage/current waveforms and stabilise the voltage.

This is stated in the tiny instruction manual and implied in the waveforms on the packaging (see Fig.2).

In the "Before" diagrams on the left-hand side of Fig.2, you will see a rather ragged looking voltage waveform at top and a set of voltage (blue) and current (red) waveforms at bottom.

Voltage waveforms

In all the years that I have been observing 240VAC 50Hz mains waveforms, I have never seen anything as ragged as in Fig.2. In fact, the power supply authorities do maintain performance standards for harmonic content, because high values of har-

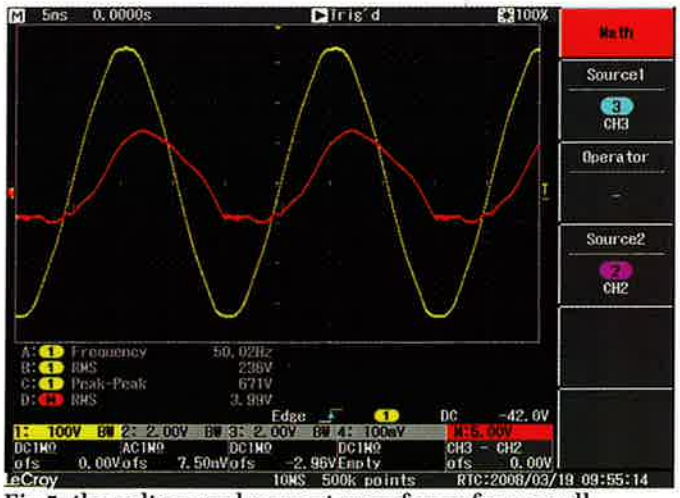


Fig.5: the voltage and current waveforms for a small refrigerator which consumes about 200W when the compressor is running. Notice the phase lag between the voltage (yellow) and the current (red). This phase lag is of no concern to the average consumer and does not cost anything.

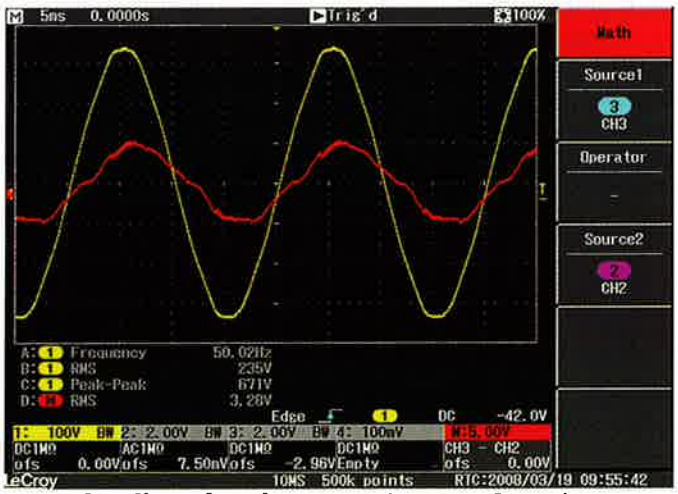


Fig.6: the effect when the Enersonic Power Saver is connected in the circuit, demonstrating that it *does* have an effect on power factor. The current waveform (red) is now more in phase with the voltage waveform (yellow) and is reduced in amplitude. Paradoxically, the power consumption actually increased by about 5W.

monics (ie, harmonic distortion) can cause problems in the distribution network.

That is not to say that distorted mains waveforms do not occur and the scope waveform of Fig.3 is quite typical of what can be observed in any commercial or domestic location. In fact, it was taken at my home on Sydney's northern beaches.

Notice that it is flattened on the peaks and troughs, as well as being not quite smooth as it should be on the sloping sections. In fact, we have the equipment to measure such harmonic distortion but in this case we did not have to go to the trouble of making "safe" connections to make such a measurement.

Instead, we had an Ideal Voltage Performance Monitor (VPM) in for review at the same time.

This instrument monitors voltage, impulses (ie, transient spike voltages), total harmonic distortion (THD) and other parameters.

Typically, when monitoring the 240VAC mains waveform in the SILICON CHIP offices, this gives readings around 1.2–1.3%. However, at the time that the waveform on the scope was recorded, its readings were much higher at around 3.3%.

So we were able to use the Ideal VPM to monitor the mains voltage parameters with and without the Enersonic Power Saver connected and with various loads such as a refrigerator and vacuum cleaner connected.

Guess what? The Power Saver made zero difference to the observed waveforms or the measurements on the VPM.

We expected nothing more, of course, but we had to go through the process.

We also monitored the voltage and current waveforms for a small refrigerator in the SILICON CHIP kitchen, as shown in Fig.3.

In this case there is a phase lag between the voltage waveform (yellow trace) and the current waveform (red trace). This is to be expected with the inductive load presented by the fridge's compressor motor.

We then connected the fridge via the Power Saver and made the measurement again. This showed that the power factor correction capacitor does indeed work, as we would have expected. (See Fig.4).

Notice that the red current trace is not only more in phase with the yellow voltage trace but is also reduced in amplitude. So that's good. But at the same time, we were measuring the power consumption and the difference was not what you would expect.

Checking power consumption and power factor

We had two options to measure power consumption. The first was our own Appliance Energy Meter (SILICON CHIP, July & August 2004) or a much more compact Multi-Function Energy Meter from Jaycar (Cat MS-6115). Interestingly, this latter device will give a reading of the power factor of the load. Bingo!

So we plugged in the fridge via the Jaycar unit. It read the fridge's power consumption at 220W or thereabouts but it tends to drop the longer the compressor runs. And it gave a power factor reading of around 57, which equates to 0.57.

Plugging the Enersonic Power Saver into the dual GPO then changed the power factor reading to around 87 or thereabouts, showing that it was indeed correcting the power factor. But the power consumption reading

Jaycar's Multi-Function Energy Meter

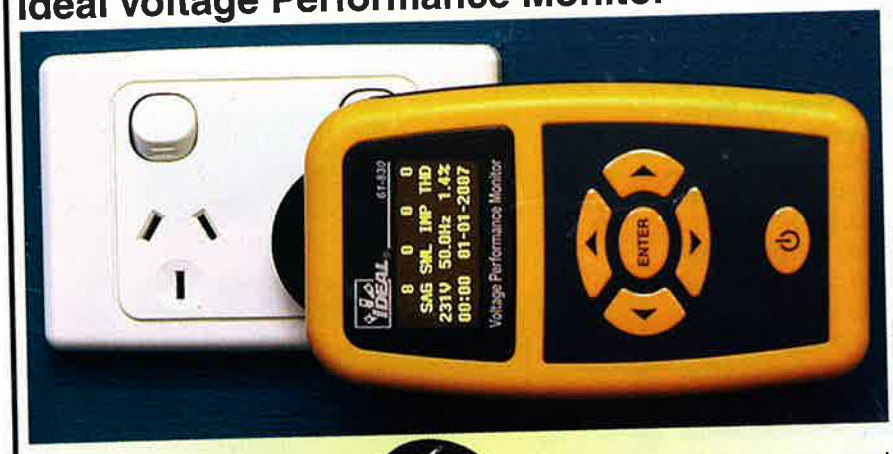
During the testing of the Enersonic Power Saver we used the Jaycar Energy Meter in helping to assess whether power was being saved (or more being used).

It has a 3-pin socket so the appliance you wish to monitor can be simply plugged into it. It has switches to allow it to display the mains voltage and appliance current, power consumption, power factor, and overload current, mains frequency and the time.

You can enter in your electricity tariff and display the cost of running the appliance over a given length of time. The meter works well but we found the displayed units are very small and difficult to read.

The Multi-Function Energy Meter is available from all Jaycar Electronics stores and website at $39.95 including GST. (Cat MS-6115).

Ideal Voltage Performance Monitor



This compact instrument captures and logs mains-specific voltage parameters that can affect the performance of equipment such as induction motors, sensitive instrumentation, medical equipment and so on.

It reads and displays four parameters: true RMS voltage, impulse voltage (above 450V to 4kV, positive or negative), THD (total harmonic distortion) and mains frequency from 45-65Hz.

In addition, it will display and log the deviation from the nominal voltage (ie, 240V) as a SAG or SWELL (SWL) together with the logged time.

Impulses are displayed as IMP, with the magnitude in kV and duration in microseconds, again with the logged time. THD is displayed as percentage (eg, 1.3%)

Up to 512 events can be logged and subsequently scrolled through with the enter and navigation buttons.

The display is a bright yellow OLED type and it can be inverted just in case the VFM is plugged into a GPO which places it upside down.

Unfortunately, the 2-pin Australian socket adaptor it comes with will normally position the instrument sideways, so you have to crook your head to read the display (see photos above).

That aside, this is powerful instrument for monitoring mains voltage.

For further information, contact Trio Smartcal. Phone 1300 853 407
Fax 1300 853 409
Email: trio@smartcal.com.au

increased. Whoa! That's not right. We didn't believe it.

Repeating the power consumption test with the SILICON CHIP Appliance Energy Meter also showed an increase when the Power Saver was plugged in but in this case it was only a few watts. Nevertheless, rather than giving no change which we expected, there was an increase. I repeated these tests with a small fridge in my home and came up with exactly the same results – an increase in power consumption, not a decrease.

Summary

OK, so where does all that leave us? Our conclusions were:

(1) The Enersonic Power Saver may provide a degree of power factor correction for inductive loads BUT

(2) It will not result in any reduction in real power as measured by any appliance energy meter or the meters in your power box at home. It will probably lead to a small increase.

(3) It does not "clean up" voltage and current waveforms and it does not have any means of doing so.

A few other comments should be made. The Enersonic Power Saver is stated to be "Designed & Engineered in Australia". That may well be true but electrically, it is *very* similar to the Electricity saving box, which was claimed to be the latest technology from Germany.

It also has an Australian Approval Number (NSW 22555). This shows that it complies with Australian electrical standards but that in no way indicates that it will do what it claims.

Enersonic also suggest that "For best results, use 3 to 4 pieces of Power Saver per typical size home". Apart from being poorly expressed, this is a lie! There is no power saving with one device and the power saving with four such devices will be exactly four times zero = zero.

So how do you save on power bills?

There are no magic bullets to save power with the existing appliance line-up in any home. The only ways to save power in your household are not to use your appliances as much, not to open fridge/freezer doors as often, to turn remote-controlled devices (audio/video especially) off instead of leaving them on "standby" and finally, to buy more efficient appliances.

There are no gadgets that can do it for you. SC

Taking the back off reveals a 6μF capacitor, a bridge rectifier, VDR, LED, a couple of smaller capacitors . . . how's that deja vu going now? This shot is virtually same size.